of the eggs. Contrary to the common prejudice, it is a fact that spermatozoa are much more sensitive and are killed much sooner than the egg.

My experiments at Pacific Grove were carried on with *Strongylocentrotus franciscanus* and *purpuratus*. In both animals artificial parthenogenesis can easily be accomplished.

In the experiments at Pacific Grove I enjoyed the valuable assistance of Mr. W. E. Garrey.

Jacques Loeb.

The University of Chicago.

April 3, 1900.

A CURIOUS PHASE OF INTER-STREAM EROSION IN SOUTHERN OREGON.

The 'Rogue River Valley,' in southwestern Oregon, is one of the five great depressed areas of the Pacific Coast country, which separate the Klamath and Coast ranges from the Sierra Nevada and Cascade Mountain systems. Its main stream, the Rogue River, issues from deep cañons in the Cascade Range, and flows thence, in its middle course, through a broad valley whose floor is a flat plain, two to five or more miles in width. In crossing the basin, the stream found soft strata to work upon, and not being obliged to cut deep, it eroded a broad valley, strongly contrasting with the cañons above and the narrow, rocky gorge in which the river makes its passage through the Klamath Mountains near the sea. All the tributary streams within the area of the basin have eroded similarly broad, flat-bottomed valleys, and between them they have reduced to a local base-level, the greater portion of an area forty or fifty miles in length by twenty to thirty miles in width. Within these limits there are many hills and low mountains, remnants of the Tertiary strata in which the broad valleys are excavated, but they are quite insignificant in comparison with the high mountains which enclose the basin, of which the Siskiyou range on the southwest rises to 7000 feet and over, and the Cascades on the east to 6000 feet on the average, surmounted by the beautiful volcanic, snow-clad cone of Mt. Pitt.

Since the partial base-leveling of the 'Rogue River Valley,' which doubtless was accomplished nearly at sea-level, the territory has been elevated and the basin tilted, mainly toward the northwest. The valley plain descends from an altitude of about 1900 feet at Ashland to less than 1300 feet where the C. & O. R. R. approaches the Rogue River. In ascending along the river, the gradual rise in the plain is everywhere quite perceptible, and it has attained an altitude of approximately 2000 feet where the main stream issues from the foot-hills proper of the Cascade Mountains. This tilting has increased the gradient of the streams, causing them to cut below the old level, and all the principal ones now flow in comparatively narrow, sharp-cut, cañon-shaped troughs, excavated from 30 to 75 feet below the valley plain. These cañons are few and widely separated, telling of the youthfulness of this new cycle of erosion.

The inter-stream tracts are broad plains, undissected by deep gulleys. Some portions of them are without timber or even chaparral, although generally supplied with a sparse growth of grass, and in the vernacular of the country are known as deserts. It is on these 'deserts,' some of which are four or five miles in length and one to three miles in width, that is developed the peculiar type of surface erosion which has given rise to this paper.

When viewed from a distance, the surface of the 'deserts' appears to be remarkably even, suggesting an absolutely uneroded, water-laid deposit such as might result from the complete filling of a broad, shallow lake basin. But, upon endeavoring to cross these barren plains in the rainy

season, the traveler is unpleasantly made acquainted with the fact that the whole surface is cut up by a system of shallow gulleys or gutters, in which water commonly stands, but there is rarely observed a flowing stream. This system of gulleys is not of the familiar dendritic type of other regions. The gutters are all connected, but branch and inter-branch in a very confusing manner. There seem to be no trunk streams (properly so called) and tributaries. In fact, there is a perfect net-work or labyrinth of gutters carved into the surface of the plain, completely surrounding and isolating low, gently rounded mounds of gravelly material from 30 to 150 feet in diameter, and whose tips represent the original plain surface of the valley floor, and give these 'deserts' their apparent evenness as seen from a distance.

The gutters are from 3 to 30 feet in width, and are constantly narrowing and widening from no cause which has yet appeared. Sometimes they head in a small rounded basin, 30 to 50 feet in diameter. Indeed, it may be said that the whole system is made up of rounded, elongated basins, connected by narrower channels. *Yet whatever may be the width, all portions of these gulleys are trenched to about the same depth beneath the original surface, namely, about 3 feet.* The little basins at the heads are as deep as the gulleys on the borders of the 'deserts' where they are about to enter the cañon valleys of the main streams. They are floored with rounded, waterworn cobbles of black volcanic rock, of comparatively uniform size, and never seem to contain any ordinary stream deposits such as gravel or sand.

The settlers of the region commonly refer to these depressions, containing standing water during the rainy season, as 'pot-holes,' but it is obvious that they do not represent the typical remolinos or pot-holes of stream-bed erosion. I have the following explanation to offer: The surface formation of these 'desert' tracts is a bed of obscurely stratified, water-laid gravel and sand, containing a scattering of waterworn cobbles. The material has come largely out of the Cascade Mountains, as is indicated by the large numbers of fragments of chalcedony, agate and opal scattered over the 'deserts.' It was spread far and wide across the valley floor by the Rogue river and tributaries, perhaps during a short period of slight depression, and probably is the equivalent in taxonomic position of the Red Bluff gravels of the Sacramento Valley (of about the age, it seems to me, of the Illinoian drift-sheet of the Mississippi Basin). The cañon valleys have been carved since, trenching this gravel formation and cutting into the harder Tertiary rocks below. They reveal to us the fact that the gravel is only a thin layer, usually not much exceeding three or four feet in thickness, spread over the beveled edges of the older formations, which were base-leveled to form the general even floor of the valley.

During ordinary seasons, the erosion of the gulleys proceeds very slowly or not at all, but I learn from the inhabitants that at certain times, not often occurring, after very heavy rain storms, there is a decided movement of the water in the gutters, and at such times, the finer material of the gravel formation may be removed and carried into the cañons, while the cobbles remain behind to encumber the flat floors of the depressions. This erosive action is only active as far down as the base of the gravel, where the much harder volcanic rock is encountered, and this may account for the remarkably uniform depth of the gulleys. Their varying width and the labyrinthine character of the system may be due to some structural feature of the gravel formation, not appearing upon a casual examination.

OSCAR H. HERSHEY.

BRAGDON, CALIF.,
Feb. 5, 1900.